(Tpeak-Tend)/QRS and (Tpeak-Tend)/(QT x QRS): novel markers for predicting arrhythmic risk in Brugada syndrome

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I read the recent paper by Zumhagen and colleagues with great interest, who demonstrated that the interval from the peak to the end of the electrocardiographic T wave ($T_{peak} - T_{end}$) and ($T_{peak} - T_{end}$)/QT ratio, were strongly risk markers for Brugada patients with life-threatening ventricular arrhythmias [1]. These ratios reflect the transmural dispersion of repolarization (TDR), increases in which can lead to unidirectional conduction block and reentry [2].

Nevertheless, $T_{peak} - T_{end}$, ($T_{peak} - T_{end}$)/QT ratio and TDR do not take into account the contribution of cellular depolarization or action potential conduction, which is abnormal in Brugada syndrome [3]. The latter finding is in keeping with prolonged QRS duration on the electrocardiogram that suggests intra-ventricular conduction delay [4]. Pre-clinical experiments suggest that excitation wavelength, λ, given by conduction velocity x effective refractory period), may be a better predictor of arrhythmogenicity, because it combines both depolarization and repolarization parameters. However, a major disadvantage of λ is that it must be determined invasively. A recent study proposed calculating the ratio of the time taken of repolarization to that of depolarization, i.e. QT/QRS (index of Cardiac Electrophysiological Balance, iCEB) [5]. The advantage of this index is that it can be easily determined from the electrocardiogram and can be used by the bedside to approximate λ.

Given that T_{peak}-T_{end} interval is a better predictor of arrhythmic risk than QT interval, it follows that it should replace QT interval in the calculation of iCEB. Thus, I propose two novel markers, (T_{peak}-T_{end})/QRS and T_{peak}-T_{end} / (QT x QRS) for stratification of arrhythmic risk. (T_{peak}-T_{end})/QRS can easily be calculated by the bedside or in the clinic, whereas (T_{peak}-T_{end})/(QT x QRS) is potentially more accurate for use in epidemiological studies. Both indices are firmly based on physiological principles that λ is critical in the determination of arrhythmic tendency. Their validity will require further investigation, and may ultimately provide better predictive values than T_{peak}-T_{end} or ($T_{peak} - T_{end}$)/QT ratio.

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